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# Public Health Reports

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## CULTIVATION OF MUMPS VIRUS IN THE DEVELOPING CHICK EMBRYO AND ITS APPLICATION TO STUDIES OF IMMUNITY TO MUMPS IN MAN<sup>1</sup>

By KARL HABEL, *Surgeon, United States Public Health Service*

Mumps in civilian populations does not usually constitute a serious public health problem. Epidemics are relatively infrequent, mortality negligible, and disability in children is usually of mild degree with few complications. In military populations, however, mumps may become a serious problem, causing much disability and interfering greatly in the training program of new recruits (1, 2). Because of its importance in military medicine it would seem worth while to work out practical means of determining susceptibility and of prophylactic immunization.

Until recently the only means of studying mumps experimentally has been in the monkey (3), chimpanzee (4), and, questionably, in the cat (5). Swan and Mawson (6) have attempted to grow the virus in the developing chick embryo, with inconclusive results.

The purpose of this report is to describe the propagation of mumps virus in the developing chick embryo and the application of this culture virus in the study of mumps immunity in man.

A complement fixation reaction employing human and monkey convalescent mumps serums, and monkey parotid virus as antigen has been described by Enders and Cohn (7), who also have made a preliminary report on the use of the monkey parotid virus in a skin test for mumps susceptibility in man (8).

### METHODS AND MATERIALS

#### MONKEY INOCULATIONS

Tuberculin-negative *Macacus mulatta* monkeys weighing from 5 to 10 pounds were inoculated through a blunt needle with 2 cc. of infectious material injected directly into the opening of each Stenson's

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<sup>1</sup> From the Division of Infectious Diseases, National Institute of Health.

duct. Rectal temperatures were taken daily and the parotid glands were harvested when swelling and fever appeared to be at its height. Passage parotids were checked pathologically and in many experiments where the monkeys were not sacrificed a complement fixation test was run on both acute and convalescent serums as a further check on infection.

#### ROUTES OF EGG INOCULATIONS

*Yolk sac.*—Six- or seven-day-old chick embryos were infected with 1 cc. of inoculum introduced through a slit cut in the air-sac end of the egg.

*Amniotic sac.*—The shell over the entire air sac was removed and the shell membrane was stripped off from the underlying chorioallantoic membrane with forceps. This gave adequate visualization of the embryo and its membranes so that with the aid of a dissecting microscope a needle could be introduced into the amniotic sac under direct vision. From 0.05 to 0.1 cc. of inoculum was injected into each amniotic cavity. The opening in the air sac was then covered with a half eggshell, which had been sterilized by autoclaving. Observation of the embryo and membranes was made by removal of the eggshell cap. Embryos 9 to 10 days old were used for amniotic sac passages.

*Allantoic sac.*—The method of Burnet and Beveridge (9) was used. Usually 1-cc. amounts of inoculum were injected into embryos 9 to 10 days old.

#### COMPLEMENT FIXATION

The method described by Enders and Cohn (7) was employed in most serum titrations. When 2 units of complement as described (7) were employed, many tests were found in which the antigens (either monkey parotids or egg) were anticomplementary. This was overcome by titrating the complement in the presence of antigen. With a complement titration done in the presence of antigen at 37° C. for 1 hour, 2 units of complement usually were equivalent to 1½ units of the same complement titrated in the same manner, but at 37° C. for 1 hour fixation followed by 4° C. overnight before adding the hemolytic system.

Antigen titrations were done in much the same way. Complement was titrated in the presence of serum and 1½ units used in the test, fixation being carried out at 37° C. for 1 hour without overnight ice-box incubation. By duplicate testing the ice-box technique with 2 units of complement gave no higher antigen titers than 37° C. for 1 hour fixation, using 1½ units of complement.

In serum titrations the antigen used in early experiments was the supernatant from a centrifuged 1/30 dilution of monkey mumps parotid emulsion. All recent serum tests have employed as antigen

the yolk-sac virus diluted to the point where 0.2 cc. contained 4 complement-fixing antigen units.

In antigen titrations the serum used was a single pool of convalescent mumps monkey serums inactivated at 62.5° C. for 20 minutes and diluted to the point where it contained 4 to 8 units of complement-fixing antibody (1/20 to 1/40 dilution). Four-plus fixations were considered as end points unless otherwise indicated.

Human serums for titration were inactivated at 60° C. for 20 minutes.

#### VIRUS NEUTRALIZATION TESTS

*In vitro neutralization of virus.*—Equal parts of human or monkey mumps serums and egg-passage virus were mixed. After 2 hours at 37° C. the mixtures were inoculated into eggs. After incubation for the time usually employed for each type of egg virus, materials were harvested and tested by antigen titration in the complement fixation test for presence of virus. If no virus multiplication could be demonstrated by complement fixation then the neutralization test was considered positive.

#### SKIN TESTS IN MAN

Monkey mumps parotid and egg-passage antigens after centrifuging at 1,000 r. p. m. for 10 minutes were diluted to contain from 2 to 4 complement-fixing antigen units. All antigens were heated at 65° C. for 10 minutes, tested for sterility, and then stored at -70° C. until used. Control antigens were prepared in the same way from normal monkeys and chick embryos. In the test 0.1 cc. of the mumps antigen was inoculated intracutaneously into the flexor surface of the forearm and the control antigen into the opposite forearm. Readings were made 24 to 36 hours later.

#### SOURCE OF VIRUS

The M strain of mumps virus used throughout these experiments was isolated in January 1942 from human saliva collected 36 hours after the onset of mumps. The primary isolation, as well as secondary monkey passage of this strain, was accomplished by Senior Surgeon Alexander G. Gilliam in this laboratory. To the present time this strain of mumps virus has been through 39 monkey passages. The clinical response in monkeys inoculated with this virus has been the same as that previously described (3).

#### CHICK EMBRYO PASSAGES

##### ALLANTOIC-SAC PASSAGE

A 20-percent emulsion of monkey parotid (Mo 260—thirty-fourth monkey passage), which was removed at the height of clinical mumps

and found to be sterile, was employed as inoculum after being kept frozen at  $-70^{\circ}\text{C}$ . One cubic centimeter of the supernatant of this emulsion was inoculated into the allantoic sacs of 10-day-old chick embryos. The inoculated eggs were incubated at  $35^{\circ}\text{C}$ . and the allantoic fluid harvested 7 days after inoculation. Subsequent passages were made with either diluted or undiluted allantoic fluid and harvesting was done from the seventh to the tenth days after inoculation. Table 1 shows the results of complement fixation titers of each passage allantoic fluid. No virus was demonstrable until the fourth passage. Deaths in passages to date have been irregular and no gross lesions have been consistently found in dead embryos. Histological examination of embryos and membrane at the time of harvest has shown no pathological changes.

TABLE 1.—*Complement fixation antigen titers of mumps virus in chick embryo passage by different routes*

Passage number	Routes of chick embryo inoculation			Passage number	Routes of chick embryo inoculation		
	Allantoic sac	Amniotic sac	Yolk sac		Allantoic sac	Amniotic sac	Yolk sac
1.....	0	$\frac{3}{4}$	$\frac{3}{8}$	9.....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{128}$
2.....	0	$\frac{1}{2}$	$\frac{3}{64}$	10.....	0	$\frac{1}{2}$	$\frac{3}{64}$
3.....	0	$\frac{1}{16}$	$\frac{1}{128}$	11.....	$\frac{1}{2}$	$\frac{1}{4}$	.....
4.....	1 $\frac{1}{4}$	$\frac{1}{16}$	$\frac{1}{128}$	12.....	$\frac{1}{2}$	$\frac{1}{2}$	.....
5.....	2 $\frac{1}{2}$	$\frac{1}{16}$	$\frac{1}{32}$	13.....	.....	$\frac{1}{4}$	.....
6.....	Strain	$\frac{1}{2}$	$\frac{1}{16}$	14.....	.....	$\frac{1}{4}$	.....
7.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{32}$	15.....	.....	$\frac{1}{4}$	.....
8.....	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{64}$				

<sup>1</sup> Undiluted fluid.

<sup>2</sup> Dilution of antigen giving 4+ fixation.

It has been possible by complement fixation technique to show that the virus is partially adsorbed on the urates which precipitate out of the allantoic fluid when it is thawed.

#### AMNIOTIC-SAC PASSAGE

The parotid glands of monkey Mo 241 (thirty-seventh monkey passage) were removed aseptically and a 20-percent emulsion made in saline. From 0.05 to 0.1 cc. of the parotid supernatant was inoculated into 10-day-old embryos. The eggs were incubated at  $35^{\circ}\text{C}$ . for 6 days, when the amniotic fluid was harvested. All subsequent passages were with amniotic fluid undiluted or diluted 1/10. Harvests were made from 3 to 5 days after inoculation. The complement fixation titers of each passage amniotic fluid are shown in table 1. Virus was demonstrated in all passages. Deaths that occurred were due to the trauma of inoculation and no gross pathological changes were noted in the embryos or the membranes. Histological examination of passage embryos revealed nothing abnormal.



## YOLK-SAC PASSAGE

One cubic centimeter of the same monkey parotid emulsion used in the amniotic-sac passage was inoculated into the yolk sacs of 6-day-old embryos. Yolk sacs were harvested after 11 days' incubation at 35° C. Ten cubic centimeters of buffered salt solution were added for each yolk sac following emulsification either in a ball mill or Waring blender. Subsequent passages were made in 5-, 6-, or 7-day-old embryos using the undiluted or up to 1/16 dilution of the emulsion. Yolk sacs were harvested 7 to 12 days after inoculation. Complement fixation titers of all passages are shown in table 1. Virus was demonstrated in all passages. Deaths in early passages were irregular as to the time of occurrence but starting at the third passage at least 50 percent of the embryos inoculated had died before being harvested. Actually the time of harvesting was selected as that day on which at least 50 percent were dead. In recent passages the 50-percent death end point has been fairly consistently on the seventh or eighth day after inoculation. Grossly those embryos that died show petechial hemorrhages of the skin and in the yolk sac. The organs of the embryo have shown no consistent gross changes except for a yellow appearance of the livers. Histological changes found in embryos dying in the seventh passage were large dilated and distended blood vessels in the liver and an inflammatory process in the alveolar sacs and interstitial tissues of the lung, but live embryos at the time of harvest in this same passage were histologically normal.

## IDENTIFICATION OF CHICK-EMBRYO PASSAGE VIRUS AS MUMPS

## MONKEY-PAROTID INOCULATION

Monkeys Mo 326 and Mo 316 received into each Stenson's duct 2 cc. of undiluted allantoic fluid from the fifth allantoic-sac passage eggs. Monkeys Mo 318 and Mo 320 received undiluted amniotic fluid from the sixth amniotic sac passage in eggs, while the third passage of 1/10 diluted yolk sac from yolk sac passage eggs was given to monkeys Mo 302 and Mo 315. All monkeys responded with parotid swelling and all but one with fever. One month after inoculation, when all swelling and fever had subsided, these monkeys, together with fresh monkeys 2262 and Mo 208, received 2 cc. of a 20-percent emulsion supernatant of monkey 206 parotid (thirty-eighth monkey passage mumps virus) in each Stenson's duct. None of the monkeys previously inoculated with egg-passage virus developed parotid swelling although several had a febrile response. Both control monkeys developed typical swelling but no fever. All monkeys had been bled before the original egg-virus inoculation, before the test-virus inoculation, and again 1 month after the latter. Complement fixation titers

were run on these serums together with preinoculation and convalescent serums from the two control monkeys. Table 2 shows the results of these immunity tests and of the complement fixations.

TABLE 2.—*Infectivity of chick-embryo passage virus for monkeys and results of test of immunity*

Monkey number	First intraparotid inoculation egg-passage virus				Second intraparotid inoculation monkey-passage virus			
	Complement fixation before inoculation	Type of egg passage virus inoculated	Fever	Parotid swelling	Complement fixation before inoculation	Fever	Parotid swelling	Complement fixation 1 month after inoculation
Mo 326.....	0	(1)	+++	+++	1/512	+++	0	1/512
Mo 316.....	0	(1)	+++	++++	1/256	+	0	1/256
Mo 318.....	0	(2)	0	+++	1/128	0	0	1/512
Mo 320.....	0	(2)	+	++++	1/512	+	0	1/512
Mo 302.....	3/4	(2)	+	+++	1/64	++	0	1/512
Mo 315.....	0	(2)	+	++++	1/32	++	0	1/32
2262.....	-----	-----	-----	-----	1/2	0	++++	1/128

<sup>1</sup> Allantoic sac.

<sup>2</sup> Amniotic sac.

<sup>3</sup> Yolk sac.

#### COMPLEMENT FIXATION REACTIONS OF CHICK-EMBRYO VIRUS

*Antigen titrations, infected and normal egg antigens compared.*—Allantoic fluid, amniotic fluid, and yolk sac of normal chick embryos of the same age as those on virus passage at the time of harvest were collected along with normal monkey parotids. The mumps antigens were from seventh passage yolk sac, combined fifth- and eighth-passage allantoic sac, combined seventh-, tenth-, and eleventh-passage amniotic sac and thirty-fifth monkey-passage parotids. Antigen titrations were run against pool No. 1 of convalescent mumps monkey serum diluted 1/32. The results as seen in table 3 show a specific fixation of complement by all mumps egg antigens in the presence of mumps immune serum.

TABLE 3.—*Complement fixation antigen titrations against mumps monkey immune serum with chick-embryo mumps passage and normal antigens*

Antigen	Antigen dilutions					Antigen controls		
	Undiluted	1/2	1/4	1/8	1/16	Undiluted	1/2	1/4
Mumps monkey parotid.....	14	4	3	1	0	0	0	0
Normal monkey parotid.....	0	0	0	0	0	0	0	0
Mumps yolk sac.....	4	4	3	1	0	0	0	0
Normal yolk sac.....	0	0	0	0	0	0	0	0
Mumps amniotic fluid.....	4	3	1	0	0	0	0	0
Normal amniotic fluid.....	0	0	0	0	0	0	0	0
Mumps allantoic fluid.....	4	4	1	0	0	0	0	0
Normal allantoic fluid.....	0	0	0	0	0	0	0	0
Serum control.....	0	-----	-----	-----	-----	-----	-----	-----

<sup>1</sup> 4=complete fixation of complement.



*Acute and convalescent human and monkey mumps serums titrated against egg passage virus compared to monkey parotid virus and normal antigens.*—Serum titers were determined against the mumps and normal antigens used in the antigen titrations. The serums titrated consisted of an acute and a convalescent sample from a typical case of mumps in a young adult and acute and convalescent serums from a mumps passage monkey. The titration end points are shown in table 4 and obviously the mumps egg antigens specifically fixed complement in the presence of mumps immune serum.

TABLE 4.—*Complement fixation serum titers against monkey and chick-embryo antigens*

Serum	Monkey parotid		Yolk sac		Allantoic fluid		Amniotic fluid	
	Normal	Mumps	Normal	Mumps	Normal	Mumps	Normal	Mumps
Human acute mumps.....	0	0	0	0	0	0	0	0
Human convalescent mumps.....	0	$1\frac{1}{2}$	0	$\frac{1}{2}$	0	$\frac{1}{16}$	0	$\frac{1}{8}$
Monkey acute mumps.....	0	0	0	0	0	0	0	0
Monkey convalescent mumps.....	0	$\frac{1}{4}$	0	$\frac{1}{32}$	0	$\frac{1}{32}$	0	$\frac{1}{64}$

<sup>1</sup> Highest twofold dilution of serum giving either 3+ or 4+ fixation with fixed dilution of antigen.

IN VITRO NEUTRALIZATION OF CHICK-EMBRYO PASSAGE VIRUS BY  
CONVALESCENT MUMPS MONKEY SERUM

Yolk sac from second passage at 1/10 dilution, undiluted amniotic fluid from eleventh amniotic-sac passage and undiluted allantoic fluid from eighth allantoic-sac passage were each mixed with equal parts of acute and convalescent mumps monkey serum respectively. After 2 hours' incubation at 37° C. the mixtures were inoculated into chick embryos by the appropriate route. Harvests were made at the time usual for each type of egg passage and the antigens titrated by complement fixation against a known mumps immune serum. The results shown in table 5 indicate a specific neutralization of each of the mumps egg virus strains by convalescent mumps monkey serums.

TABLE 5.—*In vitro neutralization of chick-embryo passage virus as tested by inoculation of serum-virus mixtures into eggs by the homologous route*

Serum mixed with virus	Egg materials harvested from eggs inoculated with serum- and egg-passage virus mixtures		
	Yolk sac	Amniotic fluid	Allantoic fluid
Acute mumps monkey.....	$1\frac{1}{128}$	$\frac{1}{4}$	$\frac{1}{16}$
Convalescent mumps monkey.....	0	0	0
Virus only.....	$\frac{1}{128}$	$\frac{1}{2}$	$\frac{1}{8}$

<sup>1</sup> Complement fixation antigen titers.

## VIRUS MULTIPLICATION IN THE CHICK EMBRYO

As further evidence of growth rather than carry-over of virus in egg passage, materials were harvested from inoculated eggs at various periods of incubation and antigen titrations made by complement fixation. Eggs were inoculated with fourth-passage yolk-sac, third-passage allantoic-sac, and seventh-passage amniotic-sac materials. The results shown in table 6 show a progressive growth of virus in each instance.

TABLE 6.—*Multiplication of mumps virus in eggs after different intervals of incubation*

Method of virus passage in chick embryos	Complement fixation antigen titers of egg materials (days after inoculation)									
	0	1	2	3	4	5	6	7	8	9
Yolk sac.....				0		$\frac{1}{16}$		$\frac{1}{16}$		$\frac{1}{32}$
Amniotic sac.....	0	0	$\frac{1}{2}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$				
Allantoic sac.....				0		0			$\frac{1}{4}$	

<sup>1</sup> Highest twofold dilution of antigen giving 4+ fixation with mumps immune monkey serum.

## APPLICATION OF CHICK-EMBRYO VIRUS TO ROUTINE COMPLEMENT FIXATION TESTS

When run in parallel employing the complement fixation test it was demonstrated (see table 4) that egg antigens gave as high or higher titers than did parotid antigens. Likewise, when used as antigen for serum titrations by complement fixation the serum titers were as high or higher than with the parotid antigens. (See table 3.)

We now use yolk-sac passage virus as our antigen in routine complement fixation tests on serums because of its high antigen content. The yolk-sac antigen is routinely diluted to the point where it contains 4 to 8 antigen units. For most yolk antigens this represents a 1/320 dilution by weight of the original yolk sac, thus a large amount of antigen is available from but 1 egg.

One experiment has been made on the effect of storage at 5° C. on the yolk sac complement fixing antigen. The antigen without preservative maintained its titer after 5 weeks' storage, but not at 9 weeks.

The routine technique of testing serum for mumps complement-fixing antibodies is as follows: The technique of the preparation and standardization of the hemolytic system is that described by Bengtson (10) for complement fixation in rickettsial diseases. Complement is titrated in the presence of antigen at 37° C. for 1 hour. The unit is taken as the smallest amount of complement which causes complete hemolysis. One and one-third units of complement are used in the test. The antigen is prepared from the supernatant (1,000 r. p. m. for 10 minutes' centrifuging) of a 1/10 suspension in saline of infected yolk sacs, held frozen in sealed ampoules at -70° C. until used.

After an antigen titration has been run on a batch of yolk-sac virus the yolk-sac material is diluted with salt solution until it contains 4 units of complement fixing antigen. Human serums are inactivated at 60° C. for 20 minutes at a 1/2 dilution. The test is set up with serum dilutions from 1/2 to 1/512, using 0.2-cc. amounts. To this is added 1½ units of complement made up to 0.2-cc. amount. Then is added 0.2 cc. of diluted antigen. All tubes are shaken individually and incubated 1 hour at 37° C. Then is added 0.4 cc. of sensitized sheep cells, the hemolysin (2 units per 0.2 cc.) and 2 percent sheep cells having been thoroughly mixed 10 minutes previously. Tubes are shaken again individually and incubated 1 hour at 37° C., then placed in ice box overnight. Included as controls in each test are duplicate tubes of the first three lower dilutions of the serums being tested with salt solution substituted for the antigen, antigen control with salt solution substituted for serum, standard positive serum run in all the dilutions used on test serums, and hemolytic-system control using 1/2, 1, 1½ and 2 units of complement.

#### APPLICATION OF CHICK-EMBRYO VIRUS TO SKIN TESTING IN MAN

Comparisons of the skin reactions caused by egg antigens with those caused by monkey-parotid antigen were performed in 3 groups of individuals. The first group consisted of 29 adults tested at some time during the course of clinical mumps with repeat tests done on several early and late in their disease. The second group included 15 children between the ages of 5 and 10 years with a negative history of mumps. The third group was made up of 14 adults with a history of having had mumps from 5 to 40 years previously. In table 7 are shown the various comparisons made in each group of individuals and the degree of correlation between egg and monkey-parotid antigen reactions. Of all 58 individuals tested not 1 gave a positive reaction

TABLE 7.—Comparison of skin tests in man with monkey-parotid virus and chick-embryo virus antigens

Groups skin tested	Chick-embryo virus antigen compared to monkey-parotid virus antigen											
	Yolk sac				Amniotic sac				Allantoic sac			
	Yolk sac+ Parotid+	Yolk sac+ Parotid-	Yolk sac- Parotid+	Yolk sac- Parotid-	Amniotic sac+ Parotid+	Amniotic sac+ Parotid-	Amniotic sac- Parotid+	Amniotic sac- Parotid-	Allantoic sac+ Parotid+	Allantoic sac+ Parotid-	Allantoic sac- Parotid+	Allantoic sac- Parotid-
Adults, clinical mumps...	11	4	0	0	11	2	0	2	14	3	0	3
Adults, positive history mumps	4	2	0	0	4	1	0	0	4	1	0	0
Children, negative history mumps	2	2	0	1	0	0	0	5	0	0	0	5

<sup>1</sup> Number of individuals.

with monkey-parotid antigen and a negative reaction with egg antigen. However, in 15 individuals a positive reaction was obtained with the egg antigens and a negative with monkey-parotid antigen. In individuals with a history of mumps the positive skin reactions were moderate, the majority being from 10 to 20 mm. in diameter of redness with but moderate edema. In general, reactions to egg antigens tended to be larger and more definite than the monkey-antigen reactions. No severe reactions were seen. Reactions to the control antigens were relatively rare with the exception of a group of individuals who had previously received several inoculations with a yolk-sac typhus fever vaccine (Cox type). Of 26 individuals who had received at least one course of typhus vaccine 9 had a positive control reaction (redness  $10 \times 10$  mm. or larger), but in no instance was this as large as the reaction due to the corresponding mumps antigen. All 9 of these reactions were to yolk-sac control antigen. Of 42 individuals who had never received typhus vaccine there were 8 who had a positive reaction to control material. Seven of these 8 were in children and were the result of testing with normal monkey-parotid antigen which had been filtered through a Berkfeld N filter. In most of these children the mumps parotid antigen reaction was negative but this antigen had not been so filtered.

#### PROPERTIES OF MUMPS CHICK-EMBRYO VIRUS FILTERABILITY

Yolk-sac passage virus after Berkfeld N filtration still fixed complement with immune serum although the antigen titer was lowered. This Berkfeld N filtrate regularly infected eggs by yolk-sac inoculation. In two runs of yolk-sac virus filtered through collodion membranes under pressure the filtrate from a membrane of  $540\text{-m}\mu$  average pore diameter contained complement-fixing antigen and infected embryos; while that filtered through  $380\text{-}$  and  $250\text{-m}\mu$  membranes did not contain complement-fixing antigen nor did it infect eggs.

#### RESISTANCE TO PHYSICAL AND CHEMICAL AGENTS

Yolk-sac passage virus 10-percent emulsion supernatant was exposed to various degrees of heat for 20 minutes, to 0.2 percent formalin at  $4^{\circ}\text{C.}$ , to 1.5 volumes of anhydrous ether for 30 minutes at  $4^{\circ}\text{C.}$ , and to ultraviolet irradiation for varying periods of time.<sup>2</sup>

These samples were all tested for viable virus by inoculation into the yolk sac of chick embryos which were harvested and tested by complement fixation for growth of virus. Most samples were also tested directly for complement-fixing antigen titers. The yolk-sac mumps virus is apparently inactivated by  $55^{\circ}\text{C.}$  for 20 minutes, by 0.2 percent

<sup>2</sup> Oppenheimer-Levinson type ultraviolet lamp (11).

formalin at 4° C. in 24 hours or less, by 1.5 volumes of ether, and by 0.28 seconds' exposure to ultraviolet irradiation. In spite of the loss of viability of the virus when exposed to these agents it retains its ability to fix complement with immune serum.

#### INFECTIVITY FOR THE CHICK EMBRYO

*Titration of chick-embryo passage virus in the chick embryo.*—Yolk-sac virus of sixth passage amniotic fluid from fourteenth amniotic-sac passage and allantoic fluid from ninth allantoic-sac passage were diluted in buffered salt solution and various dilutions inoculated into eggs by the homologous route. Eggs were harvested at the usual interval for each route and materials from eggs inoculated with each dilution were tested for presence of virus by complement fixation. The yolk-sac virus titered to  $10^{-6}$ , amniotic-sac virus to  $10^{-2}$ , and allantoic-sac virus to  $10^{-5}$ .

*Ability to infect chick embryos with egg-passage virus when inoculated by heterologous routes.*—Yolk-sac virus of passage 6, amniotic-sac virus of passage 12, and allantoic-sac virus of passage 11 were each diluted to contain equal amounts of complement-fixing antigen and inoculated separately into chick embryos of appropriate age by the yolk-sac, amniotic-sac, and allantoic-sac routes. Harvests were made of the material corresponding to the route of inoculation at the interval usually used for that route. All antigens were tested for the presence of virus by complement fixation. In the doses employed yolk-sac virus infected eggs by the amniotic-sac route but not by the allantoic-sac; amniotic-sac virus infected yolk sac but not allantoic sac; and allantoic-sac virus infected both yolk and amniotic sacs.

*Distribution of virus in chick embryo by different routes of egg passages.*—Chick-embryo brain, whole chick embryo, yolk sac, allantoic fluid, amniotic fluid, and chorioallantoic membrane from eggs on passage by each of the three methods of carrying the virus were tested for the presence of virus by complement fixation. Mumps virus by all three methods of egg passage is apparently widely distributed through the embryo and its membranes, but in amounts less than are found at the site of inoculation.

#### ATTEMPTS AT PRIMARY ISOLATION OF MUMPS VIRUS IN CHICK EMBRYO FROM SALIVA

Two attempts have been made to isolate mumps virus from saliva obtained from cases of mumps in the acute stage. The saliva was filtered through a Berkfeld N filter and inoculated into yolk sac and amniotic sac of chick embryos. The eggs were harvested at 12 and 5 days, respectively, and tested for presence of virus by complement fixation. Up to four passages were made in eggs but at no time could virus be demonstrated by complement fixation.



## DISCUSSION

Following the work of Enders (7, 8) which showed the possibilities of complement fixation and skin test studies in mumps employing monkey-parotid virus, it became obvious that these tools could not be put to practical use unless a more available source of mumps virus was developed. Likewise, any opportunity for the production of a mumps vaccine was impossible until such a source of virus was obtained. By the growth of mumps virus in the chick embryo this easily available source of virus in large amounts has been accomplished.

The applicability of this egg virus to complement fixation, virus neutralization, and skin tests opens the way for a practical approach to the study of the epidemiology of mumps in military forces.

## SUMMARY

Mumps virus has been grown in the yolk sac, the amniotic sac, and the allantoic sac of the developing chick embryo.

The chick embryo has been shown to be a suitable source of antigen for use in the complement fixation and the diagnostic skin test in man.

A virus neutralization test in eggs has been demonstrated.

Within the limits of the collodion membrane technique, the virus has been shown to be greater than 340  $\mu$  in particle size.

The mumps virus is quite susceptible to the inactivating effects of heat, formalin, ether, and ultraviolet irradiation.

Attempts to isolate virus from saliva of mumps patients employing the chick-embryo technique have failed.

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## PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

December 31, 1944—January 27, 1945

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended January 27, 1945, the number reported for the corresponding period in 1944, and the median for the years 1940-44.

### DISEASES ABOVE MEDIAN PREVALENCE

*Diphtheria.*—For the 4 weeks ended January 27 there were 1,384 cases of diphtheria reported as compared with 1,059, 1,355, and 1,481 for the corresponding periods in the years 1944, 1943, and 1942, respectively. The 1940-44 median for this period is represented by the 1943 figure (1,355 cases). Increases over the 1944 incidence were reported from all sections of the country except the East North Central region, but the increase over the preceding 5-year median appeared to be largely due to a relatively large number of cases in the South Atlantic and Pacific sections.

*Meningococcus meningitis.*—The number of cases (935) of meningococcus meningitis reported for the current 4-week period was only about 40 percent of the incidence for the corresponding period in 1944, but it was more than four times the 1940-44 median. The current epidemic of this disease has been in progress since 1941 and every section of the country has reported a relatively high incidence. While it is probable that the peak of the present epidemic was passed in 1943, the incidence may still continue at a comparatively high level, since previous epidemics have been accompanied by high rates for 1 or 2 years before and after the peak year. An increase of this disease is normally expected at this season of the year and the rate of increase during the current period was about normal. An average of approximately 350 cases was reported for this period in the years 1931-42, inclusive, or slightly more than one-third of the current figure.

*Poliomyelitis.*—During the current 4 weeks there were 147 cases of poliomyelitis reported, which was about 25 percent above the 1944 incidence during the same weeks and 10 percent above the normal seasonal expectancy. The disease was slightly above normal in 6 of the geographic regions and below the expectancy in 3 sections. Of the total cases, 29 occurred in New York, 12 in California, 9 each in Ohio and Washington, and 5 each in Maine and Illinois. No more than 4 cases were reported from any other State.

*Scarlet fever.*—The incidence of scarlet fever was also relatively high. For the 4 weeks ended January 27 there were 18,876 cases reported, which was slightly more than 10 percent above the 1944 figure for these weeks and about 35 percent above the preceding 5-year median. The disease was above the normal seasonal prevalence in all sections except the East South Central, with the largest relative excesses over the 5-year medians occurring in the West South Central,<sup>1</sup> Mountain, and Pacific sections. For the country as a whole the current incidence is the highest since 1939, when approximately 20,600 cases were reported for the corresponding weeks.

*Influenza.*—For the 4 weeks ended January 27 there were 17,103 cases of influenza reported, as compared with 261,979 cases for the corresponding period in 1944 and a 1940-44 median of 51,859 cases. The highest incidence was still confined to the South Atlantic and

*Number of reported cases of 9 communicable diseases in the United States during the 4-week period Dec. 30, 1944-Jan. 27, 1945, the number for the corresponding period in 1944, and the median number of cases reported for the corresponding period, 1940-44*

Division	Current period	1944	5-year median	Current period	1944	5-year median	Current period	1944	5-year median
	Diphtheria			Influenza <sup>1</sup>			Measles <sup>2</sup>		
United States.....	1,384	1,059	1,355	17,103	261,979	51,859	5,362	49,851	36,328
New England.....	37	44	28	147	1,252	124	454	3,336	2,720
Middle Atlantic.....	96	93	174	42	1,505	187	531	9,996	9,996
East North Central.....	137	168	179	157	17,344	4,595	474	17,474	3,786
West North Central.....	159	94	117	88	14,751	1,079	301	5,421	2,033
South Atlantic.....	223	179	263	4,723	67,740	25,134	535	5,704	2,171
East South Central.....	129	83	109	1,206	41,766	5,278	275	2,294	1,059
West South Central.....	342	195	297	9,774	89,640	10,968	687	1,596	883
Mountain.....	71	49	65	803	18,006	2,383	226	2,149	2,149
Pacific.....	190	154	112	163	10,975	2,143	1,879	1,881	4,426
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States.....	953	2,273	230	147	119	136	18,976	17,066	14,150
New England.....	43	193	23	10	4	4	1,989	1,666	1,660
Middle Atlantic.....	205	559	49	34	10	13	3,722	3,052	3,061
East North Central.....	165	441	21	23	17	17	4,562	4,059	4,145
West North Central.....	79	168	11	8	5	14	2,100	1,942	1,557
South Atlantic.....	131	317	53	19	5	12	1,975	1,462	1,287
East South Central.....	98	216	22	8	5	10	682	693	688
West South Central.....	103	143	24	9	24	14	954	484	395
Mountain.....	23	34	8	14	10	7	1,131	1,314	569
Pacific.....	106	202	23	22	39	32	1,861	2,394	909
	Smallpox			Typhoid and paratyphoid fever			Whooping cough <sup>2</sup>		
United States.....	34	49	127	211	253	312	8,965	7,069	15,883
New England.....	0	0	0	7	5	10	1,298	557	1,551
Middle Atlantic.....	0	0	0	58	16	41	1,906	1,314	3,992
East North Central.....	7	7	59	15	75	45	1,529	1,417	3,647
West North Central.....	3	15	23	7	9	14	444	426	722
South Atlantic.....	1	4	4	39	30	49	1,302	1,457	1,672
East South Central.....	8	6	6	9	49	26	264	346	466
West South Central.....	6	6	13	36	36	66	940	655	655
Mountain.....	9	9	9	26	18	18	323	356	560
Pacific.....	0	2	6	14	15	18	970	541	1,442

<sup>1</sup> Mississippi and New York excluded; New York City included.

<sup>2</sup> Mississippi excluded.

South Central sections. Of the total number of cases, Texas reported 8,560, South Carolina 2,889, Virginia 1,465, Oklahoma 678, and Arizona 531 cases. More than 80 percent of the total cases were reported from those 5 States. The incidence was below the normal seasonal expectancy in all sections except the New England. The peak of the 1943-44 influenza epidemic was reached during the first week of January 1944 with approximately 127,000 reported cases. The highest weekly incidence reported so far during the current winter was 4,587 cases, reported for the week ended January 6.

*Measles.*—The incidence of measles was also relatively low, the total of 5,362 cases being only about 10 percent of the 1944 figure for this period and about 15 percent of the 1940-44 median. Each section of the country shared in the favorable situation with respect to this disease. For the country as a whole and for the Atlantic Coast and North Central sections the current incidence was the lowest for this period in the 17 years for which data are available.

*Smallpox.*—Again smallpox stood at a relatively low level, 34 cases being reported for the current period as compared with 49 in 1944 and a preceding 5-year median of 127 cases. No cases were reported from the North Atlantic and Pacific sections and in other sections the incidence either closely approximated the seasonal expectancy or fell considerably below it.

*Typhoid and paratyphoid fever.*—This disease was also considerably less prevalent than in recent years. For the current 4 weeks there were 211 cases reported, as compared with 253 for the corresponding period in 1944 and a 5-year median of 312 cases. The disease was below normal in all sections except the Middle Atlantic and Mountain sections; a 40-percent increase was reported from each of those sections.

*Whooping cough.*—The number of cases (8,985) reported for the 4 weeks ended January 27 represented a 27-percent increase over the number reported for the corresponding period in 1944, but the incidence was less than 60 percent of the normal seasonal expectancy. Six of the geographic regions reported increases over the 1944 incidence, but only one section, the West South Central, reported an increase over the preceding 5-year median.

#### MORTALITY, ALL CAUSES

For the 4 weeks ended January 27 there were 39,094 deaths from all causes reported to the Bureau of the Census by 93 large cities. The 1942-44 average for the corresponding period was 41,876 deaths. Due to the 1943-44 epidemic the preceding 3-year average is considerably above the current number of deaths. Compared with the corresponding weeks in the 2 years preceding the epidemic period,

the number of deaths for the current period was about 4 percent below the 1942 figure and was slightly below the number of deaths reported in 1941.

### DEATHS DURING WEEK ENDED JANUARY 27, 1945

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 27, 1945	Correspond- ing week, 1944
<b>Data for 93 large cities of the United States:</b>		
Total deaths.....	9,742	10,068
Average for 3 prior years.....	9,803	
Total deaths, first 4 weeks of year.....	39,096	45,664
Deaths under 1 year of age.....	622	634
Average for 3 prior years.....	651	
Deaths under 1 year of age, first 4 weeks of year.....	2,533	2,629
<b>Data from industrial insurance companies:</b>		
Policies in force.....	66,943,862	66,242,194
Number of death claims.....	14,556	15,316
Death claims per 1,000 policies in force, annual rate.....	11.3	12.1
Death claims per 1,000 policies, first 4 weeks of year, annual rate.....	10.3	12.3

# PREVALENCE OF DISEASE

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*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

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## UNITED STATES

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### REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 3, 1945

#### Summary

The current incidence of diphtheria, dysentery, poliomyelitis, scarlet fever, endemic typhus fever, undulant fever, and whooping cough is significantly higher than for the same period last year, while that of influenza, measles, and meningococcus meningitis is lower.

For the current week, 47 cases of poliomyelitis were reported as compared with 22 for the same week last year. Of the current cases, New York reported 12, California 5, and Missouri and Florida 4 each. The total to date is 194, as compared with 141 for the same period last year.

Currently, 23 States reported a total of 86 cases of undulant fever, of which 23 occurred in Oregon and 31 in the North Central States. Of 354 cases reported to date this year, as compared with 184 for the same period last year, 47 occurred in Oregon and 112 in the North Central area.

Of 156 cases of typhoid fever reported during the current and the preceding week, 58 cases occurred in Pennsylvania. The total number of cases reported to date for the country as a whole is 288, as compared with 384 for the same period last year.

The incidence of endemic (murine) typhus fever so far this year has been higher each week than last year. A total of 345 cases has been reported to date as compared with 248 for the same period in 1944.

During the current week one case of rabies was reported in Missouri and one case of anthrax in Pennsylvania.

The current weekly mortality in 93 large cities in the United States is above that both for the corresponding week last year and the 3-year (1942-44) average, the first time this year that it has been above either figure. A total of 10,069 deaths was reported, as compared with 9,734 last week, 9,629 for the corresponding week last year, and a 3-year average of 9,600. The accumulated total to date is 49,157, as compared with 55,293 for the same period last year.



*Telegraphic morbidity reports from State health officers for the week ended February 3, 1945, and comparison with corresponding week of 1944 and 5-year median*

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, men- ingococcus		
	Week ended—		Med- ian 1940- 44	Week ended—		Med- ian 1940- 44	Week ended—		Med- ian 1940- 44	Week ended—		Med- ian 1940- 44
	Feb. 3, 1945	Feb. 5, 1944		Feb. 3, 1945	Feb. 5, 1944		Feb. 3, 1945	Feb. 5, 1944		Feb. 3, 1945	Feb. 5, 1944	
NEW ENGLAND												
Maine.....	1	0	0	-----	26	26	5	283	104	0	4	0
New Hampshire.....	0	0	0	-----	20	-----	0	0	16	0	0	0
Vermont.....	0	0	0	2	51	-----	4	97	12	0	1	0
Massachusetts.....	3	2	4	-----	-----	-----	54	351	438	2	17	4
Rhode Island.....	0	0	0	-----	25	1	18	275	100	0	4	0
Connecticut.....	1	1	1	-----	8	8	78	155	155	7	10	1
MIDDLE ATLANTIC												
New York.....	22	9	13	15	12	12	107	1,244	1,205	25	64	9
New Jersey.....	0	2	5	5	33	33	26	1,029	726	7	17	3
Pennsylvania.....	13	6	10	1	8	-----	62	1,757	1,757	18	35	5
EAST NORTH CENTRAL												
Ohio.....	12	0	13	1	61	61	20	1,641	180	11	29	2
Indiana.....	12	16	16	21	35	40	16	345	105	1	13	1
Illinois.....	7	21	19	3	54	54	58	716	371	24	29	1
Michigan <sup>1</sup> .....	-----	8	8	1	15	21	20	1,297	183	5	31	1
Wisconsin.....	0	0	0	16	245	84	28	1,320	554	3	12	1
WEST NORTH CENTRAL												
Minnesota.....	5	6	3	-----	2	2	5	1,011	380	1	4	0
Iowa.....	3	4	4	-----	37	11	29	386	103	2	1	0
Missouri.....	9	0	7	10	27	22	8	141	141	11	25	2
North Dakota.....	3	0	3	-----	12	28	1	291	13	0	3	0
South Dakota.....	0	1	0	-----	4	2	10	137	37	0	1	0
Nebraska.....	1	2	1	6	102	6	11	29	29	1	3	2
Kansas.....	4	6	6	2	82	82	25	258	278	0	6	0
SOUTH ATLANTIC												
Delaware.....	0	2	0	-----	-----	-----	7	13	13	0	1	0
Maryland <sup>2</sup> .....	6	1	4	4	115	115	41	467	25	0	14	5
District of Columbia.....	0	0	2	-----	9	9	5	39	18	3	5	1
Virginia.....	17	11	12	556	1,733	1,733	49	669	201	7	27	3
West Virginia.....	5	4	5	92	464	175	21	331	125	1	6	2
North Carolina.....	6	11	14	-----	78	80	22	978	152	7	16	2
South Carolina.....	7	3	4	637	1,311	1,311	7	271	114	1	13	9
Georgia.....	2	2	6	65	227	227	23	240	93	2	8	3
Florida.....	6	2	5	2	16	16	28	78	30	3	6	2
EAST SOUTH CENTRAL												
Kentucky.....	8	2	6	2	668	91	10	115	115	9	11	3
Tennessee.....	2	2	6	61	156	156	30	114	112	6	13	4
Alabama.....	10	8	8	160	482	700	8	274	68	7	16	2
Mississippi <sup>2</sup> .....	8	3	3	-----	-----	-----	-----	-----	-----	2	7	4
WEST SOUTH CENTRAL												
Arkansas.....	9	8	8	122	475	475	10	91	120	6	3	1
Louisiana.....	3	13	9	7	1,266	121	13	21	21	3	12	2
Oklahoma.....	6	5	6	117	567	567	5	63	20	1	4	0
Texas.....	70	42	42	2,259	4,388	4,388	137	476	270	13	29	5
MOUNTAIN												
Montana.....	0	0	4	11	149	31	4	218	163	0	2	0
Idaho.....	4	0	0	2	5	2	0	8	14	0	0	0
Wyoming.....	1	0	0	19	12	54	2	69	38	0	1	1
Colorado.....	5	6	6	14	175	93	14	220	220	3	1	0
New Mexico.....	9	2	2	1	3	8	0	8	18	0	0	0
Arizona.....	3	3	3	80	355	288	2	115	85	1	3	1
Utah <sup>2</sup> .....	0	0	1	5	798	28	35	14	28	1	1	0
Nevada.....	0	0	0	-----	114	1	0	3	3	0	1	0
PACIFIC												
Washington.....	5	2	1	3	5	11	58	149	149	5	11	0
Oregon.....	5	5	1	12	93	74	32	75	163	4	2	2
California.....	40	35	20	30	389	389	426	766	428	12	49	1
Total.....	339	256	310	4,334	14,912	14,912	1,574	18,648	14,031	215	571	60
5 weeks.....	1,723	1,315	1,640	21,437	276,893	65,597	6,936	68,499	50,079	1,168	2,844	290

<sup>1</sup> New York City only.

<sup>2</sup> Period ended earlier than Saturday.



*Telegraphic morbidity reports from State health officers for the week ended February 3, 1945, and comparison with corresponding week of 1944 and 5-year median—Continued*

Division and State	Polliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever <sup>1</sup>		
	Week ended—		Median 1940-44	Week ended—		Median 1940-44	Week ended—		Median 1940-44	Week ended—		Median 1940-44
	Feb. 3, 1945	Feb. 5, 1944		Feb. 3, 1945	Feb. 5, 1944		Feb. 3, 1945	Feb. 5, 1944		Feb. 3, 1945	Feb. 5, 1944	
NEW ENGLAND												
Maine.....	0	0	0	85	46	19	0	0	0	1	0	0
New Hampshire.....	0	0	0	1	12	10	0	0	0	0	0	0
Vermont.....	0	0	0	7	15	12	0	0	0	0	0	0
Massachusetts.....	0	0	0	372	385	337	0	0	0	1	2	2
Rhode Island.....	0	0	0	42	16	13	0	0	0	0	0	0
Connecticut.....	1	0	0	88	97	77	0	0	0	0	0	2
MIDDLE ATLANTIC												
New York.....	12	1	1	508	439	445	0	0	0	3	7	6
New Jersey.....	2	0	0	167	148	148	0	0	0	1	1	1
Pennsylvania.....	1	0	0	350	362	309	0	0	0	23	2	4
EAST NORTH CENTRAL												
Ohio.....	0	0	0	282	223	376	0	0	0	3	4	1
Indiana.....	0	2	0	168	158	158	2	1	2	0	70	2
Illinois.....	1	1	1	414	327	327	0	1	1	1	2	2
Michigan <sup>1</sup> .....	0	0	1	262	174	224	3	0	0	0	2	2
Wisconsin.....	0	0	0	183	291	180	0	0	0	0	1	0
WEST NORTH CENTRAL												
Minnesota.....	1	1	0	92	199	97	0	0	0	0	0	0
Iowa.....	0	0	0	86	185	74	0	1	1	0	0	3
Missouri.....	4	0	0	159	110	109	0	0	0	2	0	1
North Dakota.....	1	0	0	34	40	30	1	0	0	0	0	0
South Dakota.....	0	0	0	13	56	25	1	0	1	0	0	0
Nebraska.....	0	0	0	97	116	30	1	0	1	0	0	0
Kansas.....	0	0	0	138	115	90	0	1	1	0	0	0
SOUTH ATLANTIC												
Delaware.....	0	0	0	6	8	9	0	0	0	0	0	0
Maryland <sup>1</sup> .....	0	0	0	149	155	83	0	0	0	0	1	1
District of Columbia.....	0	0	0	85	184	21	0	0	0	1	0	0
Virginia.....	1	0	0	103	50	48	0	1	0	1	0	2
West Virginia.....	1	0	0	63	54	54	0	0	0	0	4	0
North Carolina.....	1	1	1	117	57	57	0	0	0	3	0	0
South Carolina.....	0	0	0	9	7	8	0	0	0	0	1	1
Georgia.....	1	0	1	25	15	19	0	1	0	4	3	2
Florida.....	4	1	1	14	17	13	0	0	0	0	7	2
EAST SOUTH CENTRAL												
Kentucky.....	0	1	1	97	84	84	0	1	1	0	0	0
Tennessee.....	0	0	0	53	36	67	0	1	0	1	1	1
Alabama.....	0	0	0	15	9	11	0	1	1	3	1	1
Mississippi <sup>1</sup> .....	1	0	1	63	2	10	0	1	0	5	5	2
WEST SOUTH CENTRAL												
Arkansas.....	0	0	0	60	6	9	2	0	0	0	3	2
Louisiana.....	0	1	0	14	10	10	0	0	0	3	3	3
Oklahoma.....	2	1	0	18	75	25	0	0	0	0	2	1
Texas.....	2	2	2	152	76	76	0	2	4	7	3	3
MOUNTAIN												
Montana.....	0	0	0	11	55	38	0	0	0	0	0	0
Idaho.....	1	0	0	70	40	17	0	0	0	0	0	0
Wyoming.....	0	0	0	14	12	12	0	0	0	1	0	0
Colorado.....	0	0	0	102	73	52	0	0	0	0	0	0
New Mexico.....	1	1	0	29	4	5	0	0	0	3	1	0
Arizona.....	0	0	0	20	12	10	0	0	0	0	0	0
Utah.....	0	2	0	66	166	39	0	0	0	0	0	0
Nevada.....	0	0	0	0	2	2	0	0	0	0	0	0
PACIFIC												
Washington.....	3	0	0	92	192	32	0	0	0	4	0	0
Oregon.....	1	1	0	32	89	17	0	0	0	1	0	1
California.....	5	6	3	400	361	189	0	1	1	5	5	4
Total.....	47	22	28	5,427	5,365	4,037	10	13	28	77	131	83
5 weeks.....	194	141	160	24,403	22,431	18,187	44	62	155	285	384	391

<sup>1</sup> Period ended earlier than Saturday.

<sup>2</sup> Including paratyphoid fever reported separately as follows: Massachusetts, 1; New York, 1; Illinois, North Carolina, 1; Georgia, 2; Texas, 2.

Telegraphic morbidity reports from State health officers for the week ended February 3, 1945, and comparison with corresponding week of 1944 and 5-year median—Continued

Division and State	Whooping cough			Week ended February 3, 1945							
	Week ended—		Median 1940-44	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever	Undulant fever
	Feb. 3, 1945	Feb. 5, 1944		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine.....	28	5	29	0	0	0	0	0	0	0	1
New Hampshire.....	0	0	4	0	0	0	0	0	0	0	0
Vermont.....	64	33	23	0	0	0	0	0	0	0	1
Massachusetts.....	150	87	186	0	3	0	1	0	0	0	0
Rhode Island.....	24	13	17	0	0	0	0	0	0	0	0
Connecticut.....	53	35	59	1	0	0	0	0	0	0	1
MIDDLE ATLANTIC											
New York.....	226	158	361	1	8	0	0	0	0	1	2
New Jersey.....	9	61	132	1	0	0	0	0	0	0	0
Pennsylvania.....	219	103	347	0	7	0	0	0	0	0	2
EAST NORTH CENTRAL											
Ohio.....	139	87	248	1	0	0	1	0	0	0	1
Indiana.....	14	29	39	0	0	0	0	0	1	0	3
Illinois.....	75	53	125	1	1	0	2	0	10	0	8
Michigan <sup>1</sup> .....	69	99	216	0	2	0	0	0	0	0	3
Wisconsin.....	111	134	175	0	0	0	0	0	0	0	3
WEST NORTH CENTRAL											
Minnesota.....	27	43	56	4	0	0	0	0	0	0	5
Iowa.....	11	30	30	0	0	0	0	0	0	0	5
Missouri.....	28	14	19	0	0	0	0	0	0	0	0
North Dakota.....	2	7	9	0	0	0	1	0	0	0	0
South Dakota.....	1	0	7	0	0	0	0	0	0	0	0
Nebraska.....	6	3	6	0	0	0	0	0	0	0	0
Kansas.....	47	56	41	0	0	0	0	0	1	0	3
SOUTH ATLANTIC											
Delaware.....	1	3	3	0	0	0	0	0	0	0	0
Maryland <sup>1</sup> .....	43	27	61	0	0	0	0	0	0	0	0
District of Columbia.....	1	6	9	0	0	0	0	0	0	0	0
Virginia.....	52	117	105	0	0	46	0	0	4	0	0
West Virginia.....	25	43	55	0	0	0	0	0	0	0	0
North Carolina.....	122	151	177	0	0	0	0	0	1	2	0
South Carolina.....	57	52	70	0	13	0	0	0	0	0	0
Georgia.....	14	7	18	0	1	0	0	0	0	13	5
Florida.....	19	15	12	3	0	0	1	0	0	5	1
EAST SOUTH CENTRAL											
Kentucky.....	19	71	71	0	0	0	0	0	0	0	0
Tennessee.....	22	14	41	0	0	0	0	0	1	1	0
Alabama.....	25	19	22	0	0	0	0	0	0	4	3
Mississippi <sup>1</sup> .....				0	0	0	0	0	0	7	2
WEST SOUTH CENTRAL											
Arkansas.....	21	17	17	1	3	0	0	0	0	0	1
Louisiana.....	7	5	5	0	0	0	1	0	1	1	2
Oklahoma.....	10	2	8	0	20	0	0	0	0	0	0
Texas.....	188	144	144	7	542	21	0	0	1	16	4
MOUNTAIN											
Montana.....	9	10	21	0	0	0	0	0	0	0	0
Idaho.....	0	12	9	0	0	0	0	0	0	0	0
Wyoming.....	4	7	2	0	0	10	0	0	0	0	0
Colorado.....	43	46	44	0	0	0	0	0	0	0	6
New Mexico.....	16	3	21	0	0	0	0	0	0	0	0
Arizona.....	27	18	18	0	0	11	0	0	0	0	0
Utah <sup>1</sup> .....	23	21	25	0	0	0	0	0	0	0	0
Nevada.....	0	2	2	0	0	0	0	0	0	0	0
PACIFIC											
Washington.....	20	73	73	0	0	0	0	0	0	0	0
Oregon.....	12	38	29	0	0	0	0	0	0	0	23
California.....	239	81	250	2	9	0	0	0	0	1	1
Total.....	2,322	2,054	3,856	22	609	88	7	0	21	51	86
Same week, 1944.....	2,054			18	184	56	10	0	11	49	38
Average, 1942-44.....	3,412			21	130	44	10	*1	16	*44	30
5 weeks: 1945.....	11,307			135	3,387	812	30	1	154	343	354
1944.....	9,123			117	1,199	270	44	0	65	248	184
Average, 1942-44.....	16,854		*19,739	100	741	213	41	*3	107	*248	153

<sup>1</sup> Period ended earlier than Saturday.

\* 5-year median, 1940-44.

Anthrax: Pennsylvania, 1 case. Rabies in man: Missouri, 1 case.

## WEEKLY REPORTS FROM CITIES

City reports for week ended January 27, 1945

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland.....	0	0	-----	0	0	0	1	0	12	0	0	0
New Hampshire:												
Concord.....	0	0	-----	0	1	0	0	0	2	0	0	0
Massachusetts:												
Boston.....	1	1	-----	0	29	0	10	0	105	0	0	30
Fall River.....	0	0	-----	0	1	0	0	0	1	0	0	8
Springfield.....	0	0	-----	0	1	0	1	0	4	0	0	0
Worcester.....	0	0	-----	0	0	0	15	0	16	0	0	7
Rhode Island:												
Providence.....	0	0	-----	0	0	0	4	0	8	0	0	26
Connecticut:												
Bridgeport.....	0	0	-----	0	0	0	2	0	1	0	0	1
Hartford.....	2	0	-----	0	27	0	2	0	15	0	0	6
New Haven.....	0	0	-----	0	1	1	2	0	7	0	0	9
MIDDLE ATLANTIC												
New York:												
Buffalo.....	0	0	-----	0	3	0	5	1	10	0	0	1
New York.....	8	0	-----	3	4	24	16	78	0	265	0	93
Rochester.....	0	0	-----	0	0	4	0	2	0	4	0	25
Syracuse.....	0	0	-----	0	0	0	2	1	0	3	0	16
New Jersey:												
Camden.....	0	0	-----	0	0	1	3	0	1	0	1	0
Newark.....	0	0	-----	1	0	2	2	3	0	18	0	3
Trenton.....	0	0	-----	0	1	1	1	0	5	0	0	0
Pennsylvania:												
Philadelphia.....	1	0	-----	1	0	6	7	31	0	81	0	14
Pittsburgh.....	2	0	-----	2	3	0	0	8	0	15	0	28
Reading.....	0	0	-----	0	2	0	3	0	1	0	1	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	0	0	-----	0	3	2	16	0	26	0	0	8
Cleveland.....	0	0	-----	0	0	2	6	12	1	76	0	37
Columbus.....	0	0	-----	1	0	0	1	3	0	9	0	14
Indiana:												
Fort Wayne.....	1	0	-----	0	1	0	1	0	3	0	0	0
Indianapolis.....	0	0	-----	1	1	2	5	0	27	0	0	3
South Bend.....	0	0	-----	0	0	0	0	0	4	0	0	1
Terre Haute.....	0	0	-----	1	1	0	2	0	4	0	0	0
Illinois:												
Chicago.....	0	0	-----	2	23	11	29	1	135	0	0	21
Springfield.....	0	0	-----	0	5	0	2	1	13	0	0	1
Michigan:												
Detroit.....	10	0	-----	2	3	2	10	0	110	0	0	17
Flint.....	0	0	-----	0	3	0	5	0	10	0	0	0
Grand Rapids.....	0	0	-----	0	0	0	3	0	11	0	0	0
Wisconsin:												
Kenosha.....	0	0	-----	0	0	0	0	0	3	0	0	18
Milwaukee.....	0	0	-----	3	3	6	2	12	0	37	0	2
Racine.....	0	0	-----	0	4	0	0	0	6	0	0	5
Superior.....	0	0	-----	0	0	0	0	0	0	0	0	3
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	-----	0	0	0	0	0	5	0	0	1
Minneapolis.....	1	0	-----	1	1	1	3	0	14	0	0	14
St. Paul.....	1	0	-----	0	0	0	3	0	9	0	0	15
Missouri:												
Kansas City.....	0	0	-----	0	4	1	13	0	34	0	0	3
St. Joseph.....	0	0	-----	0	0	0	0	0	12	0	0	0
St. Louis.....	0	0	-----	3	0	0	3	22	1	45	0	10

## City reports for week ended January 27, 1945—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles, cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo.....	0	0	2	0	0	0	0	0	0	0	0	0
Nebraska:												
Omaha.....	1	0		0	6	1	2	0	19	0	0	1
Kansas:												
Topeka.....	0	0		0	3	2	2	0	7	0	0	1
Wichita.....	0	0		0	0	0	3	0	16	0	0	0
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0		0	0	0	2	0	0	0	0	0
Maryland:												
Baltimore.....	8	0	2	1	7	0	17	0	57	0	0	38
Cumberland.....	0	0		0	0	0	0	0	7	0	0	0
Frederick.....	0	0		0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington.....	0	1	1	0	7	0	17	0	70	0	0	6
Virginia:												
Lynchburg.....	0	0		0	1	0	1	0	5	0	0	0
Richmond.....	0	0		1	1	3	0	0	4	0	0	1
Roanoke.....	0	0		0	1	0	1	0	3	0	0	0
West Virginia:												
Charleston.....	0	0		0	0	0	0	0	1	0	0	0
Wheeling.....	0	0		0	6	0	1	0	4	0	0	0
North Carolina:												
Raleigh.....	0	0		0	0	0	2	0	1	0	0	6
Wilmington.....	1	0		0	1	0	3	0	5	0	0	3
Winston-Salem.....	0	0		0	10	0	2	0	6	0	0	3
South Carolina:												
Charleston.....	0	0	32	0	6	0	3	0	1	0	1	0
Georgia:												
Atlanta.....	1	0	6	0	0	3	1	0	10	0	0	3
Brunswick.....	0	0		0	2	0	3	0	2	0	0	4
Savannah.....	0	0	5	1	0	0	5	0	1	0	0	0
Florida:												
Tampa.....	0	0		0	1	0	4	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	2	4	22	1	20	0	9	0	0	17
Nashville.....	0	0		0	0	2	3	0	5	0	0	0
Alabama:												
Birmingham.....	0	0		1	0	0	6	0	6	0	0	0
Mobile.....	0	0	2	1	0	0	2	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0		0	1	0	0	0	0	0	0	1
Louisiana:												
New Orleans.....	8	1	9	4	11	4	8	0	16	0	0	5
Shreveport.....	0	0		1	0	0	5	0	0	0	0	0
Texas:												
Dallas.....	0	0		0	0	0	2	0	4	0	0	2
Galveston.....	0	0		0	0	0	0	0	1	0	0	0
Houston.....	3	0		0	0	3	5	0	7	0	1	0
San Antonio.....	2	0	3	1	0	0	8	0	9	0	0	0
MOUNTAIN												
Montana:												
Billings.....	0	0		0	0	0	1	0	3	0	0	0
Great Falls.....	0	0		0	0	0	0	0	3	0	0	0
Helena.....	0	0		0	0	0	2	0	1	0	0	0
Missoula.....	0	0		0	1	0	2	0	0	0	0	0
Idaho:												
Boise.....	1	0		0	0	0	0	0	3	0	0	0
Colorado:												
Denver.....	6	0	2	0	4	1	3	1	21	0	0	6
Pueblo.....	0	0		0	0	0	0	0	9	0	0	0
Utah:												
Salt Lake City.....	0	0		0	17	0	1	1	12	0	0	1

## City reports for week ended January 27, 1945—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles, cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough case
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle.....	3	0	-----	2	9	0	6	0	18	0	0	1
Spokane.....	2	0	-----	0	0	0	2	0	2	0	0	0
Tacoma.....	0	0	-----	1	2	0	0	0	3	0	0	1
California:												
Los Angeles.....	6	1	11	3	21	5	2	0	59	0	0	11
Sacramento.....	2	0	-----	0	2	2	2	0	12	0	0	0
San Francisco.....	0	0	1	0	50	2	10	0	33	0	0	7
Total.....	71	4	92	39	351	90	472	7	1,622	0	18	551
Corresponding week, 1944.....	64	-----	796	137	3,547	-----	603	-----	1,646	1	9	355
Average, 1940-44.....	77	-----	1,768	180	2,967	-----	1,567	-----	1,312	3	14	964

<sup>1</sup>3-year average, 1942-44.

<sup>2</sup>5-year median, 1940-44.

*Dysentery, amebic.*—Cases: New York, 2; Chicago, 1; Los Angeles, 1.

*Dysentery, bacillary.*—Cases: New York, 8; Chicago, 1; Detroit, 2; Charleston, S. C., 7; Los Angeles, 14; San Francisco, 1.

*Dysentery, unspecified.*—Cases: Cincinnati, 5; Richmond, 1; San Antonio, 6.

*Tularemia.*—Cases: St. Louis, 1.

*Typhus fever, endemic.*—Cases: Atlanta, 2; Savannah, 3; Birmingham, 2; Mobile, 1; Little Rock, 1; San Antonio, 1; Los Angeles, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 1943, 34,385,900)

	Diphtheria case rates	Eucephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England.....	7.9	2.6	0.0	0.0	158	2.6	97.1	0.0	449	0.0	0.0	228
Middle Atlantic.....	5.1	0.0	3.2	3.2	19	13.4	62.5	0.5	187	0.0	7.4	80
East North Central.....	6.7	0.0	2.4	6.1	32	15.8	60.8	1.8	288	0.0	0.0	79
West North Central.....	6.0	0.0	9.9	2.0	28	15.9	95.5	2.0	320	0.0	0.0	90
South Atlantic.....	16.3	1.6	75.2	4.9	70	9.8	101.3	0.0	289	0.0	1.6	105
East South Central.....	0.0	0.0	23.6	35.4	130	17.7	183.0	0.0	118	0.0	0.0	100
West South Central.....	37.3	2.9	34.4	17.2	34	20.1	80.3	0.0	106	0.0	2.9	23
Mountain.....	55.6	0.0	15.9	0.0	175	7.9	71.5	15.9	413	0.0	0.0	56
Pacific.....	20.6	1.6	19.0	9.5	133	14.2	34.8	0.0	201	0.0	0.0	32
Total.....	10.8	0.6	14.0	5.9	53	13.7	71.8	1.1	247	0.0	2.7	84

## FOREIGN REPORTS

### CANADA

*Provinces—Communicable diseases—Week ended January 13, 1945.*—During the week ended January 13, 1945, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox.....		9		215	523	76	30	81	252	1,186
Diphtheria.....		3	3	41	6	3				56
German measles.....				4	13	1	1	4	21	44
Influenza.....					39	1			32	72
Measles.....	1	3	5	201	92	24	29	22	170	547
Meningitis, meningococcus.....				1	3	2			1	7
Mumps.....				349	232	19	5	92	26	723
Poliomyelitis.....					1			1		2
Scarlet fever.....		2	17	126	98	17	4	82	27	373
Tuberculosis (all forms).....		2	1	294	45	6		103	30	481
Typhoid and paratyphoid fever.....				12						12
Undulant fever.....				1	2					3
Venereal diseases:										
Gonorrhea.....		21	10	83	112	55	24	29	45	379
Syphilis.....		7	14	123	92	9	10	9	12	276
Whooping cough.....		12		164	134	8	2	19	50	389

### CUBA

*Habana—Communicable diseases—4 weeks ended January 6, 1945.*—During the 4 weeks ended January 6, 1945, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox.....	6		Scarlet fever.....	1	
Diphtheria.....	20		Tuberculosis.....	3	
Malaria.....	3		Typhoid fever.....	15	1
Measles.....	3				

### UNION OF SOUTH AFRICA

*Poliomyelitis.*—For the period July 1 to December 16, 1944, a total of 530 cases of poliomyelitis has been reported in the Union of South Africa. The numbers of cases reported for recent weeks are as follows: Weeks ended—November 25, 1944, 70 cases; December 2, 82 cases; December 9, 105 cases; December 16, 50 cases.



# WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

## CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January- November 1944	December 1944	January 1945—week ended			
				6	13	20	27
ASIA							
Ceylon.....	C	2					
India.....	C	208,472					
Calcutta.....	C	3,479	127				
Chittagong.....	C	63	1				
Madras.....	C	37	4				
Negapatam.....	C	17					
Vizagapatam.....	C	269					

## PLAGUE

[C indicates cases; D, deaths; P, present]

AFRICA							
Algeria.....	C	59	7	1	2	1	
Bechuanaland.....	C		399				
Belgian Congo.....	C	34	2				
Plague-infected rats.....	P						
British East Africa:							
Kenya.....	C	12	3	2			
Uganda.....	C	8		1			
Egypt.....	C	654					
Port Said.....	C	76					
Suez.....	C	163					
French West Africa: Dakar.....	C	562				1	
Madagascar.....	C	119	16				
Morocco (French).....	C	182	25		21		
Rhodesia, northern.....	C	1					
Senegal.....	C	71	3		14		
Sudan (French).....	D	1					
Tunisia.....	C	55	3				
Union of South Africa.....	C	48	2	1			
ASIA							
China:							
Chekiang Province.....	C	P					
Fochow.....	C	P					
Kiangsi Province.....	C	104					
India.....	C	11,025					
Indochina.....	C	57					
Palestine.....	C	82	1				
Plague-infected rats.....		222					
EUROPE							
Portugal: Azores.....	C	29					
SOUTH AMERICA							
Bolivia:							
Chuquisaca Department.....	C	5					
Santa Cruz Department.....	C	5					
Tarija Department.....	C	12					
Brazil.....	C	94					
Ecuador:							
Chimborazo Province.....	C	4					
Loja Province.....	C	12					
Peru:							
Ancash Department.....	C	60	3				
Lambayeque Department.....	C	1					
Libertad Department.....	C	7	3				
Lima Department.....	C	27	2				
Piura Department.....	C	2					
OCEANIA							
Hawaii Territory:							
Hamakua District.....	D	45					
Plague-infected rats.....		57	2				

<sup>1</sup> Pneumonic plague.

<sup>2</sup> From the beginning of the outbreak in October 1944.

<sup>3</sup> For the period Jan. 1-10, 1945.

<sup>4</sup> Includes 1 death from pneumonic plague.

<sup>5</sup> Plague infection was also proved in a pool of 53 fleas on Mar. 7, 1944, in another pool of 75 fleas on Dec. 7, 1944, in a pool of rats on Dec. 17, 1944, and in tissue from a pool of 8 mice on Aug. 20, 1944.

<sup>6</sup> Includes 12 plague-infected mice.

## SMALLPOX

[C indicates cases; P, present]

Place	January- November 1944	December 1944	January 1945—week ended				
			6	13	20	27	
AFRICA							
Algeria.....	C	954	71				
Angola.....	C	122					
Basutoland.....	C	203					
Belgian Congo.....	C	3,418					
British East Africa:							
Kenya.....	C	3,195	46				
Mombasa.....	C	147	3				
Tanganyika.....	C	2,637					
Uganda.....	C	4,296	209				
Cameroon (French).....	C	415					
Dahomey.....	C	88	1		1		
Egypt.....	C	10,970	61				
French Equatorial Africa.....	C	1,807					
French Guinea.....	C	1,081	165				
French West Africa.....	C	221	2		20		
Gambia.....	C	13	2				
Gold Coast.....	C	107					
Ivory Coast.....	C	478	3				
Mauritania.....	C	2					
Morocco (French).....	C	745					
Mozambique.....	C	5					
Nigeria.....	C	4,181					
Niger Territory.....	C	603	25		7		
Rhodesia, northern.....	C	136	85				
Senegal.....	C	193					
Sierra Leone.....	C	416					
Sudan (Anglo-Egyptian).....	C	2					
Sudan (French).....	C	2,040			48		
Togo (British).....	C	90					
Togo (French).....	C		161				
Tunisia.....	C	8					
Union of South Africa: Natal.....	C	11,848	P				
ASIA							
Arabia.....	C	26	1				
Ceylon.....	C	36	55	15	22		
China: Kunming (Yunnan Fu).....	C	54					
India.....	C	242,025					
Indochina.....	C	1,557					
Iran.....	C	792					
Iraq.....	C	54					
Palestine.....	C	165					
Syria and Lebanon.....	C	182					
Trans-Jordan.....	C	2					
EUROPE							
France.....	C	3					
Gibraltar.....	C	P					
Great Britain.....	C	18					
Greece.....	C	321					
Italy.....	C	1,260	108	22			
Portugal.....	C	32	26				
Spain.....	C	180					
Turkey.....	C	5,707	110	23	39	12	
NORTH AMERICA							
Dominican Republic.....	C	1					
Guatemala.....	C	33					
Honduras.....	C	9					
Mexico.....	C	2,483					
Panama (Republic).....	C	1	1				
SOUTH AMERICA							
Bolivia.....	C	1,092					
Brazil.....	C	7,999	86				
Chile.....	C	30					
Colombia.....	C	1,515					
Ecuador.....	C	29					
Peru.....	C	314					
Lima.....	C	31					
Venezuela.....	C	461	123				

<sup>1</sup> Approximate number of cases reported from Jan. 1944 to Nov. 9, 1944.<sup>2</sup> Includes imported cases.<sup>3</sup> Includes 1 case imported from the Middle East.<sup>4</sup> From the period Sept. 10 to Dec. 9, 1944.<sup>5</sup> Includes delayed reports for the year to date.

## TYPHUS FEVER\*

[C indicates cases; P, present]

Place		January- November 1944	December 1944	January 1945—week ended			
				6	13	20	27
AFRICA							
Algeria.....	C	1,517	158				
Basutoland.....	C	101					
Belgian Congo.....	C	71					
British East Africa: Kenya.....	C	14					
Mombasa.....	C	18					
Egypt.....	C	17,756					
French Guinea.....	C	2					
French West Africa: Dakar <sup>1</sup> .....	C	55					
Gold Coast.....	C	7					
Libya: Tripolitania.....	C	1					
Morocco (French).....	C	2,753	78		3 90		
Morocco (Spanish).....	C	11					
Mozambique.....	C	3					
Nigeria.....	C	2					
Rhodesia, northern.....	C	126	25				
Sierra Leone.....	C	33					
Sudan (Anglo-Egyptian).....	C	3					
Tunisia.....	C	963					
Union of South Africa.....	C	5,788	P				
ASIA							
Arabia: Western Aden Protectorate.....	C	4 16					
Ceylon.....	C	1					
China: Kunming (Yunnan Fu).....	C	130					
India.....	C	10					
Indochina.....	C	1,004					
Iran.....	C	6,436					
Iraq.....	C	619					
Palestine.....	C	496	8				
Syria and Lebanon.....	C	428					
Trans-Jordan.....	C	47					
EUROPE							
Belgium.....	C	10					
Bulgaria.....	C	686					
France.....	C	11					
Germany.....	C	2,467					
Gibraltar.....	C	1					
Greece.....	C	379					
Hungary.....	C	3,323	13				
Irish Free State.....	C	8	1				
Italy.....	C	10					
Netherlands.....	C	8					
Norway.....	C	1					
Portugal.....	C	25	5				
Rumania.....	C	6,000					
Slovakia.....	C	338	9				
Spain.....	C	477					
Turkey.....	C	2,514	337	83	117	100	75
Yugoslavia.....	C	8,088					
NORTH AMERICA							
Costa Rica <sup>1</sup> .....	C	2					
Cuba <sup>1</sup> .....	C		2				
Dominican Republic.....	C	10					
Guatemala.....	C	2,061	83				
Jamaica.....	C	58	2				
Mexico.....	C	1,557					
Panama Canal Zone.....	C	1					
Puerto Rico <sup>1</sup> .....	C	184	3				
Salvador.....	C	7					
Virgin Islands <sup>1</sup> .....	C	19	1				
SOUTH AMERICA							
Bolivia.....	C	344					
Brazil.....	C	4					
Chile.....	C	463					
Colombia <sup>1</sup> .....	C	303	1				
Curacao.....	C	6					
Ecuador.....	C	528					
Peru.....	C	974					
Venezuela.....	C	94	8				
OCEANIA							
Australia <sup>1</sup> .....	C	179	6				
Hawaii Territory <sup>1</sup> .....	C	157	6	2	1		

\* Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

<sup>1</sup> Reported as tick typhus, probably boutonneuse fever.

<sup>2</sup> Reports cases as murine type.

<sup>3</sup> For the period January 1-10, 1944.

<sup>4</sup> A report dated Mar. 30, 1944, states that an estimated 800 deaths from typhus fever have been reported in Western Aden Protectorate, Arabia.

<sup>5</sup> For the period Jan. 1 to May 7, 1944.

## YELLOW FEVER

(C indicates cases; D, deaths)

Place		January- November 1944	December 1944	January 1945—week ended			
				6	13	20	27
AFRICA							
Belgian Congo:							
Babeyru.....	D	2					
Banzville.....	C	13					
Bondo.....	D	1					
Leopoldville.....	C	1					
Gold Coast:							
Cape Coast.....	C	1					
Ho.....	C	1					
Kintampo.....	C	1					
Northern Territories.....	C	1					
Nsawam.....	C		1				
Sekondi.....	C	1					
Tamale.....	C	1					
Yendi.....	C	1					
Ivory Coast:							
Abidjan.....	C	1					
Divo.....	C	1					
Nigeria: Bukuru.....	C	1					
Portuguese Guinea: Port Bintam.....	C	1					
EUROPE							
Portugal: Lisbon. <sup>3</sup>							
SOUTH AMERICA							
Bolivia:							
La Paz Department.....	C	1					
Santa Cruz Department.....	C	3					
Brazil:							
Acre Territory.....	D	1					
Matto Grosso State.....	D	3					
Para State.....	D	2					
Colombia:							
Amazonas Department.....	D	1					
Boyaca Department.....	D	4					
Caldas Department.....	D	1					
Cundinamarca Department.....	D	1					
Intendencia of Meta.....	C	1					
Santander Department.....	D	4					
Santander del Norte Department.....	D		2				4
Venezuela:							
Barinas State.....	C		2				
Bolivar State.....	D	1					
Tachira State.....	C	30					

<sup>1</sup> Includes 11 cases of suspected yellow fever.<sup>2</sup> Suspected.<sup>3</sup> According to information dated Jan. 21, 1944, it is reported that a vessel which called at the islands of Sao Tome and Cape Verde arrived at Lisbon, Portugal, with cases of yellow fever on board.<sup>4</sup> For the month of January 1945.<sup>5</sup> Includes 21 cases of suspected yellow fever.

X

FEDERAL SECURITY AGENCY  
UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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